



DOE/NSF U.S. CMS Operations Program Review Closeout Report

Anadi Canepa, TRIUMF

Anna Goussiou, University of Washington,

Steven Kahn, Stanford University

Donatella Lucchesi, University of Padova

Scot Olivier, Lawrence Livermore National Laboratory

John Rutherford, University of Arizona

Gabriella Sciolla, Brandeis University

Michael Sokoloff, University of Cincinnati

Fermi National Accelerator Laboratory

March 10, 2015

The purpose of this review is to assess:

- the U.S. contributions to the operation of the LHC detectors and computing infrastructure for the fiscal years 2015–2016
- the state of readiness to resume detector operations for Run 2 commencing in spring 2015
- planning for U.S contributions to the HL-LHC detector upgrades [CMS, ATLAS] and coordination with the international collaborations within the context of the unique assessment and approval processes of DOE and NSF

Therefore, you are requested to evaluate the status of the U.S. LHC Operations Program including current commitments to the operations of the detectors, the computing facilities, the infrastructure developed for data analysis, the allocation of funds in FY15, and the proposed spending plans for FY16 – FY19



Charge (II)



1. **Management:** Assess the ability and recent performance of management to track program scope and assess outcomes relative to planned performance metrics for the prior year; prioritize activities and define appropriate deliverables; assess and manage risk; balance the manpower and funding of detector operations, computing, software operations, and upgrade R&D; and respond to unforeseen technical or funding challenges. Assess and comment on the appropriateness of planned performance metrics for the current year.
2. **Budget:** Are the costs and budget projections for operations consistent with the following funding guidance for FY 2015 – FY 2019 from DOE and NSF and with the current LHC program and schedule? Examine plans to expend carry-over funds accrued from previous years, which the experiments reported at the March 2014 review, report on whether they are appropriately developed, and recommend improvements where applicable.



Charge (III)



3. **Data Access and Analysis:** Are the tools and services for data access and analysis provided by U.S. CMS and U.S. ATLAS computing efforts adequate to support the planned research program and to respond to the increasing luminosity profile of the next 5 years? Review the experiment's data access and management plans and report on their adequacy and the effectiveness of their implementation.
4. **Preparations for LHC Detector Operations for Run 2:** Comment on the preparation of the experiments to resume and efficiently continue operations in Run 2 and discuss foreseen risks to the operation programs and the expected effectiveness of the mitigation plans in place. Report any overlooked risks and recommend strategies for their mitigation.
5. **Assessment of U.S. Contributions:** Assess the quality and appropriateness of U.S. contributions to the LHC experiments and report whether this is commensurate with the level of U.S. participation. Examine and report on the timeliness with which the U.S. responsibilities and financial obligations are being discharged.

Charge (IV)

6. **LHC [Phase-1] Detector Upgrades:** Do the Phase-1 detector upgrade plans include adequate estimates of future impacts on personnel, M&O obligations, and overlap with the operations program and the initial project period of the Phase-2 upgrades?
7. **HL-LHC [Phase-2] Detector Upgrades:** Are the experiments developing plans for the HL-LHC detector upgrades in coordination with the funding agencies while also coordinating with CERN LHCC and the international approval process? Do the upgrade plans include adequate estimates of future impacts on personnel, M&O obligations, and overlap with the Operations Program and the end of the construction and installation period of the Phase-1 upgrades?
8. **Response to Previous Reviews:** The previous year's reviews for the LHC Operations Programs were held in March 2014 at Columbia University. A Mini-Review was subsequently held in September 2014 at Rockville-Washington, D.C. to assess progress by the experiments on responses to the March 2014 comments and recommendations. Have the U.S. LHC Operations Programs responded satisfactorily to the comments, recommendations, and concerns made at these previous reviews?



Management and Budget



- 1. Management**
- 2. Budget**
- 3. Data Access and Analysis**
- 4. Preparations for LHC Detector Operations for Run 2**
- 5. Assessment of U.S. Contributions**
- 6. LHC [Phase-1] Detector Upgrades**
- 7. HL-LHC [Phase-2] Detector Upgrades**
- 8. Response to Previous Reviews**

Findings

Factual information of the experiment program provided to the panel.

Comments

Panel members comments and main evaluations of the experiment program.

Recommendations

Panel members recommendations.

- Actionable items with a well-defined timeframe
(if possible, begin with an action verb & provide a due date)



1. Management
2. Budget
3. Data Access and Analysis
4. Preparations for LHC Detector Operations for Run 2
5. Assessment of U.S. Contributions
6. LHC [Phase-1] Detector Upgrades
7. HL-LHC [Phase-2] Detector Upgrades
8. Response to Previous Reviews



Findings

Factual information of the experiment program provided to the panel.

Comments

Panel members comments and main evaluations of the experiment program.

Recommendations

Panel members recommendations.

- Actionable items with a well-defined timeframe
(if possible, begin with an action verb & provide a due date)



- 1. Management**
- 2. Budget**
- 3. Data Access and Analysis**
- 4. Preparations for LHC Detector Operations for Run 2**
- 5. Assessment of U.S. Contributions**
- 6. LHC [Phase-1] Detector Upgrades**
- 7. HL-LHC [Phase-2] Detector Upgrades**
- 8. Response to Previous Reviews (if any)**

Findings

Factual information of the experiment program provided to the panel.

Comments

Panel members comments and main evaluations of the experiment program.

Recommendations

Panel members recommendations.

- Actionable items with a well-defined timeframe
(if possible, begin with an action verb & provide a due date)



1. Management
2. Budget
3. Data Access and Analysis
4. Preparations for LHC Detector Operations for Run 2
5. Assessment of U.S. Contributions
6. LHC [Phase-1] Detector Upgrades
7. HL-LHC [Phase-2] Detector Upgrades
8. Response to Previous Reviews

Findings

Factual information of the experiment program provided to the panel.

Comments

Panel members comments and main evaluations of the experiment program.

Recommendations

Panel members recommendations.

- Actionable items with a well-defined timeframe
(if possible, begin with an action verb & provide a due date)



1. Management
2. Budget
3. Data Access and Analysis
4. Preparations for LHC Detector Operations for Run 2
5. Assessment of U.S. Contributions
6. LHC [Phase-1] Detector Upgrades
7. HL-LHC [Phase-2] Detector Upgrades
8. Response to Previous Reviews

Findings

Factual information of the experiment program provided to the panel.

Comments

Panel members comments and main evaluations of the experiment program.

Recommendations

Panel members recommendations.

- Actionable items with a well-defined timeframe
(if possible, begin with an action verb & provide a due date)



U.S. DEPARTMENT OF
ENERGY



End Closeout Report